

WHAT IS CLAIMED IS:

1. A method of removing polymer adhered to a sidewall of an etched metal layer formed on a substrate, comprising:

5 (a) dissolving said polymer by providing chemicals onto a surface of said substrate; and

(b) rinsing said chemicals out of said substrate by providing pure water onto a surface of said substrate,

10 wherein at least a part of said step (a) is carried out in oxidation atmosphere.

2. The method as set forth in claim 1, wherein said steps (a) and (b) are carried out in oxidation atmosphere.

15 3. The method as set forth in claim 1, wherein said step (a) is carried out in oxidation atmosphere from the beginning or middle thereof till said step (b) starts.

20 4. The method as set forth in claim 1, wherein said oxidation atmosphere is established after said polymer is dissolved by said chemicals until said sidewall appears.

25 5. The method as set forth in claim 1, further comprising the step of (c) rotating said substrate to splash said chemicals out of said substrate by virtue of centrifugal force, said step (c) being carried out between said steps (a) and (b).

6. The method as set forth in claim 5, wherein said step (c) is carried out in oxidation atmosphere.

7. The method as set forth in claim 1, further comprising the step (d) of drying said substrate, said step (d) being carried out after said step (b).

5        8. The method as set forth in claim 1, wherein said step (a) is carried out in inert atmosphere except while said step (a) is carried out in oxidation atmosphere.

9. The method as set forth in claim 1, wherein said steps (a) and (b) are  
10 repeatedly carried out.

10. The method as set forth in claim 1, wherein said metal layer is an aluminum layer.

15        11. The method as set forth in claim 10, wherein said aluminum layer contains copper.

12. The method as set forth in claim 1, wherein a barrier layer is formed on said metal layer.

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13. The method as set forth in claim 1, wherein said chemicals is ammonium fluoride.

14. A method of removing polymer adhered to a sidewall of an etched metal  
25 layer formed on a substrate, comprising:

(a) dissolving said polymer by providing chemicals onto a surface of said substrate;

(b) rotating said substrate to splash said chemicals out of said substrate by

virtue of centrifugal force; and

(c) rinsing said chemicals out of said substrate by providing pure water onto a surface of said substrate,

wherein at least a part of said step (a) is carried out in oxidation  
5 atmosphere when a period of time in which said step (a) is carried out is longer  
than a period of time in which said step (b) is carried out.

15. The method as set forth in claim 14, wherein said step (b) is carried out  
in oxidation atmosphere.

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16. The method as set forth in claim 14, further comprising the step (d) of  
drying said substrate, said step (d) being carried out after said step (b).

17. The method as set forth in claim 14, wherein said step (a) is carried out  
15 in inert atmosphere except while said step (a) is carried out in oxidation  
atmosphere.

18. The method as set forth in claim 14, wherein said steps (a) and (c) are  
repeatedly carried out for dissolving said polymer.

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19. The method as set forth in claim 14, wherein said metal layer is an  
aluminum layer.

20. The method as set forth in claim 19, wherein said aluminum layer  
25 contains copper.

21. The method as set forth in claim 14, wherein a barrier layer is formed  
on said metal layer.

22. The method as set forth in claim 14, wherein said chemicals is ammonium fluoride.

5        23. An apparatus for removing polymer adhered to a sidewall of an etched metal layer formed on a substrate, comprising:

(a) a substrate holder which holds at least one substrate;

(b) an external chamber movable relative to said substrate holder between a first position in which said external chamber defines a first closed space  
10 around said substrate holder and a second position in which said external chamber is kept away from said substrate holder for exposing said substrate holder to atmosphere;

(c) an internal chamber located internal of said external chamber and movable relative to both of said substrate holder and said external chamber  
15 between a first position in which said external chamber defines a second closed space around said substrate holder and a second position in which said internal chamber is kept away from said substrate holder for exposing said substrate holder to atmosphere;

(d) a chemicals source containing chemicals which dissolves said polymer;

20        (e) a pure water source containing pure water therein;

(f) an oxygen-containing gas source containing oxygen-containing gas therein; and

(g) a controller which controls movement of said external and internal chambers and flow of said chemicals and said pure water,

25        wherein said controller first keeps said internal chamber in its first position and allows said oxygen-containing gas to flow into said internal chamber for dissolving said polymer in oxidation atmosphere by providing said chemicals onto a surface of said substrate, and then, moves said internal

chamber to its second position, and keeps said external chamber in its first position for rinsing said chemicals out of said substrate by providing said pure water onto a surface of said substrate.

5           24. The apparatus as set forth in claim 23, wherein said controller allows said oxygen-containing gas to flow into said external chamber while said chemicals is rinsed out.

25. The apparatus as set forth in claim 23, wherein said controller allows  
10 said oxygen-containing gas to flow into said internal chamber at the beginning or in the middle of dissolution of said polymer.

26. The apparatus as set forth in claim 23, wherein said oxidation  
atmosphere is established after said polymer is dissolved by said chemicals  
15 until said sidewall appears.

27. The apparatus as set forth in claim 23, wherein said substrate holder is  
designed to be rotatable around an axis thereof for splashing said chemicals out  
of said substrate by virtue of centrifugal force.

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28. The apparatus as set forth in claim 27, wherein said controller allows  
said oxygen-containing gas to flow into said internal chamber while said  
substrate holder is rotating.

25           29. The apparatus as set forth in claim 23, further comprising an inert gas  
source containing inert gas therein, and wherein said controller allows said  
inert gas to flow into said external and internal chambers except while said  
oxygen-containing gas exists in said external and internal chambers.

30. The apparatus as set forth in claim 23, wherein said controller repeatedly carries out dissolving said polymer in oxidation atmosphere by providing said chemicals onto a surface of said substrate, and rinsing said chemicals out of said substrate by providing said pure water onto a surface of said substrate.

31. The apparatus as set forth in claim 23, wherein said metal layer is an aluminum layer.

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32. The apparatus as set forth in claim 31, wherein said aluminum layer contains copper.

33. The apparatus as set forth in claim 23, wherein a barrier layer is formed on said metal layer.

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34. The apparatus as set forth in claim 23, wherein said chemicals source contains ammonium fluoride.

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